STD-CUB43PCILP-V1.3E

STEP TECHNICA CO.,LTD.

STEP TECHNICA

CUnet(MKY43)PCI board

CUB-43PIC-LP

User's Manual

Note

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2. Technical information in this document, such as explanations and circuit examples, are references for this product. When actually using this product, always fully evaluate the entire system according to the design purpose based on considerations of peripheral circuits and the PC board environment. We assume no responsibility for any incompatibility between this product and your system.

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Preface

This manual describes the CUB-43PCI-LP,PCI board on which the MKY43 is mounted, a kind of CUnet.
Be sure to read “CUnet Introduction Guide” before understanding this manual and the CUB-43PCI-LP.

● Target Readers
・Those who first build on CUnet
・Those who first use StepTechnica's CUB-43PCI-LP to build on CUnet

● Prerequisites
This manual assumes that you are familiar with:
・Network technology
・Semiconductor products (especially microcontrollers and memory)

● Related Manuals
・CUnet Introduction Guide
・CUnet Technical Guide
・CUnet IC MKY43 User’s Manual

【Caution】
Some terms in this manual are different from those used on our website and in our product brochures.
The brochure uses ordinary terms to help many people in various industries understand our products.
Please understand technical information on CUnet Family based on technical documents (manuals).

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Chapter 1 Hardware

This chapter describes the CUB-43PCI-LP hardware.

1.1 Features

CUB-43PCI-LP is the CUnet communication board on which Step Technica's MKY43 IC is mounted, that have expansion bus compatible with PCI. CUB-43PCI-LP is designed for more easy operation of the MKY43 using with the attached library for Windows. Use CUB-43PCI-LP for evaluating or learning functions of MKY43.

CUB-43PCI-LP have the 8P8C modular connector interface, and the operation can be evaluated using a straight cable for 100BASE-TX, which is CAT-5 or upper.
The operation experience with CUB-43PCI-LP encourage operating the microcomputer system in which the MKY43 is embedded.

1.2 Specifications

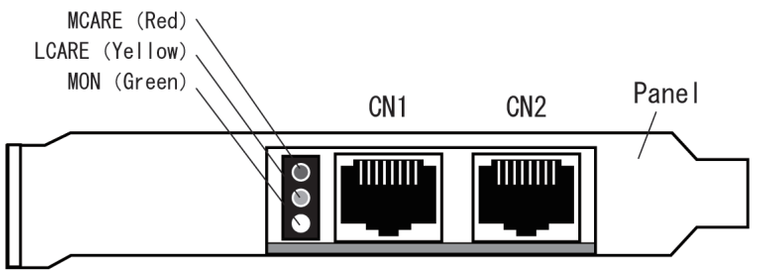
The Specifications of CUB-43PCI-LP is given in Table 1-1.

Table1-1 Specifications of CUB-43PCI-LP

Type	CUB-43PCI-LP
Type of IC mounted	MKY43 × 1
Communication method	CUnet communication method
Baud rate	3M / 6M / 12M bps half duplex
Compatible bus	32 bit, 33MHz expansion bus compliant with PCI Ver2.2 (Low Profile compliant)
Resources to be occupied	16KB, consecutive memory area (automatically allocated by PnP function)
Interrupt	1 line used (automatically allocated by PnP function)
Connector	RJ-45 modular connector : TM11R-5L-88 (50)
Power supply	DC +5V
Consumption current	Less than 500mA
Conditions of use	Temperature 0 – 50℃ Humidity 20 — 90% (with no condensation)
Board Size	120mm(W) x 64mm(H) *Panel side of the board is excluded.

1.3 Specifications of the board connectors

The panel side of CUB-43PCI-LP is shown in Fig.1.1



MON	A green LED connected to #MON pin of the MKY43. Lighted with starting communications with the MKY43.
LCARE	A yellow LED connected to #LCARE pin of the MKY43. Lighted with occurrence of LCARE.
MCARE	A red LED connected to #MCARE pin of the MKY43. Lighted with occurrence of MCARE.
CN1, CN2	CUnet communication lines. A straight cable for 100BASE-TX, CAT-5 or upper is applicable to these lines. Be sure not to connect them to Ethernet board.
Panel	The panel part is touching with the PC cabinet. Connect the PC cabinet to FG with the instruction manual of the PC. To connect metal shell and No.8 pin of CN1 / CN2 to the panel, PAD1 and PAD2 on the board need to be short-circuited.

CN1 pin, CN2 pin

Pin	Function
4	TRX-
5	TRX+
8	Shield
1, 2, 3 6, 7	Not used

Fig.1.1 Panel side view

The peripheral circuit of CN1, CN2 connectors is shown in Fig.1.2.

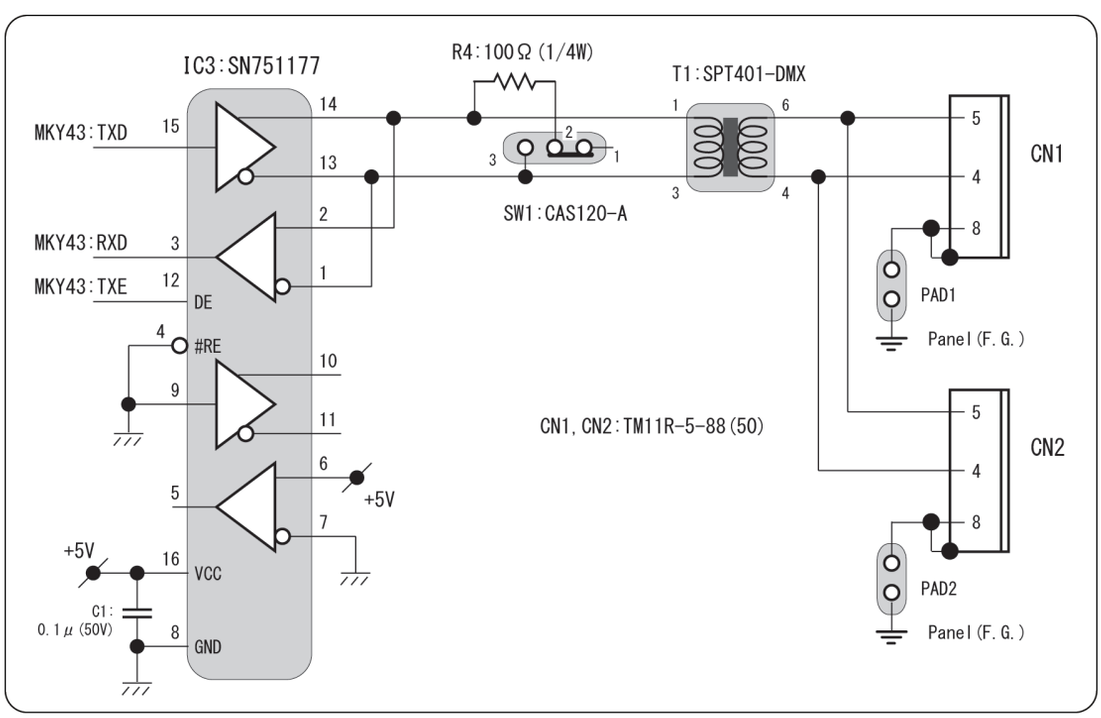


Fig.1.2 Connector peripheral circuit

1.4 DIP switches

The dip switch settings of CUB-43PCI-LP are shown in Fig.1.3.

To embed multiple CUB-43PCI-LP boards in one system platform, set SW5 board ID.
This board ID is the key to identify CUB-43PCI-LP devices by its software.

If CUB-43PCI-LP is at the middle position of multi-drop connection, (that is, the middle position of communication cable), set SW1 and SW2“OFF” (1-2) for termination.
If CUB-43PCI-LP is at the terminal position of multi-drop connection, (that is, the terminus of communication cable), set SW1 and SW2 “ON” (2-3) for termination.

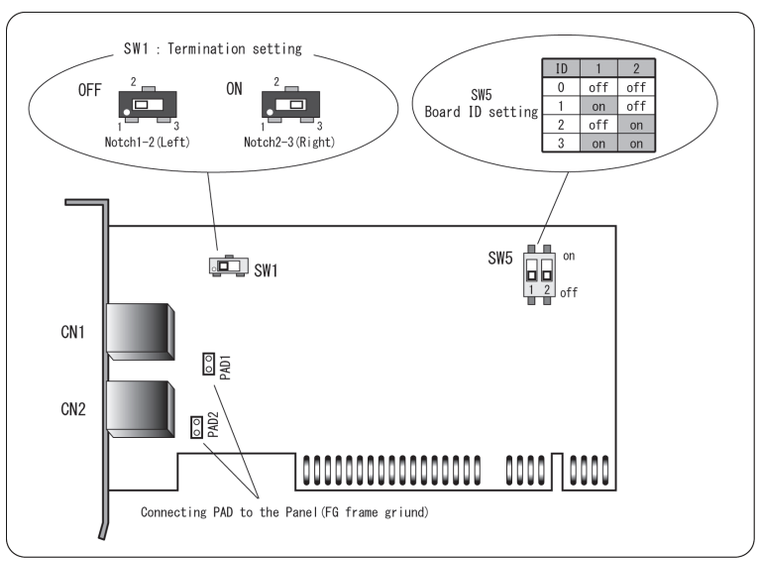


Fig.1.3 Setting of CUB-43PCI-LP board

1.5 Memory map

Memory map for CUB-43PCI-LP is listed in Table 1-2.
Address value in memory map is relative with a starting address of CUB-43PCI-LP, and actual address has the value that added a starting address of the board.

Table1-2 Memory map

Address	Function
000H ～ 1FFH	GM:Global Memory
200H ～ 2FFH	MSB:Mail Send Buffer
300H ～ 3FFH	Register and Reserved(390H ～ 3FFH)
400H ～ 4FFH	MRB0:Mail Receive Buffer0
500H ～ 5FFH	MRB1:Mail Receive Buffer1
600H ～ 7FFH	Manufacture's Reserved
C00H	Chip Reset Register
E00H	Board ID Register

1.5.1 Access to MKY43

To access to the MKY43 mounted on CUB-43PCI-LP, write access or read access to addresses "000H — 5FF" listed in Table 1-2 Memory map.
For details of each area, refer to "MKY43 User's Manual."

Do not access to addresses 600H to 7FFH (Manufacturer's reserved area.)
To do so, it may cause unstable system operation.

1.5.2 Registers unique to CUB-43PCI-LP

C00H and E00H address registers listed in Table 1-2 Memory map are unique to CUB-43PCI-LP. Details of C00H and E00H are given below.

Chip Reset Register Address : C00H

bit :	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	CRST
R/W :	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	W

[Function] Writing "1" to CRST (Chip ResST) bit (bit 0) enables to apply reset signal to RST pin of MKY43. Reset period to the RST pin of MKY43 is 240nS.
This register is write-only.If you read undefined data.

BoardID Register Address : E00H

bit :	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	---	---	---	---	---	---	---	---	---	---	---	---	---	---	BID1	BID0
R/W :	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R

[Function] Reading BID0,1 (BoardID 0,1) bit (bit 0,1) enables to obtain Board ID (BoardID) value (0 — 3) that is set to SW5.

1.6 Access without attached driver disc

For direct access to CUB-43PCI-LP without Step Technica's attached driver disc, please note the following points.

Always use 32bit memory access to CUB-43PCI-LP.
At that time, data in the lower 16 bits is valid and data in the upper 16 bits is not used.
Therefore, address value to access need to be the value which multiplied the actual address. For example, to read address 200H, read address 400H of PCI with 32bit acccess and obtain WordData in address 200H of MKY43 in the lower 16 bits out of 32 bit data that is read.
Also, to write to address 180H, write to address 300H of CUB-43PCI-LP with 32bit access and have address 180H of MKY43 obtained the data in the lower 16bits out of 32bit that is written to PCI.
The same method is necessary to make read or write acccess to registers that are unique to CUB-43PCI-LP.

Chapter 2 CUB-43PCI-LP Software

This chapter describes software for using CUB-43PCI-LP.

2.1 Outline

"DLL" folder in CUB-43PCI-LP WDM driver disc contains the driver and DLL that are compliant to Microsoft Windows XP / 7.
At the first power-on of CUB-43PCI-LP embedded PC, install the driver from attached disk with "Add Hardware Wizard" in Windows.
Admin rights are necessary to install the device driver. Please remember it at login.

Due to Windows specifications, all accesses to CUB-43PCI-LP from user's application pass through the device driver. However, since complicated process is needed for calling the device driver, API in CUB43PCILP.DLL provides more simple interface that covers its process.
At using Microsoft Windows XP / 7 as host OS, the attached software supports to use various programming tools such as Microsoft Visual Studio for easy control of CUB-43PCI-LP.

CUB-43PCI-LP and CUB-43PCIEXP use its common library.
The following subchapters describe CUB-43PCI-LP. This is applicable to CUB-43PCIEXP.

For the latest information including the addition of compliant OS or software update, visit our website (http://www.steptechnica.com.)

2.2 Copyright and disclaimer

The copyright of all documents / program / program sources in the attached driver disc are belong to Step Technica Co., Ltd..
The individuals, companies or other parties only who acccept the cautions written below and use our CUB-43PCI-LP is licenced to copy or use these works of Step Technica Co., Ltd.
Step Technica Co., Ltd.does not acccept not only to revise or distribute any part of these copyrighted works but also to copy and use for purposes not mentioned above without prior permission.

① Step Technica Co., Ltd. assume no responsibility for any results caused by using the attached driver disc or all softwares downloaded from our website.

② Use library in proper ways with its instructions.

③ All specifications and contents in the disc is subject to change without prior notice. Step Technica Co., Ltd. does not guarantees for any future replacements.

④ Step Technica Co., Ltd. does not support for the questions regarding OS or development environment not related to Step Technica products.

⑤ If any bugs or errors are found, contact Step Technica's engineer team.

2.3 Contents of files

The files in “DLL” folder in the disc are given below.

【cub43pcilp.dll】

DLL body.Copy it to the system folder of Windows or the directory in which there is the user program using this DLL before use.

【cub43pcilp.lib】

Import library for Microsoft Visual C++, built with Visual Studio2010.

【cub43pcilp.h】

DLL header file. Get this included after Windows.h at use.

2.4 How to use

The files in “DLL” folder in the disc are given below.

To control CUB-43PCI-LP device embedded in PC with cub43pcilp, initializing and terminating are ncessary. The procedure is shown below.

```
//The application made for DLL version 1.xx
Int Version = CubGetVersion();
if(Version < 0x100 || Version > 0x1FF){
   printf(“ This version of cub43pcilp does not have compatibility. ＼ n”);
   exit(1);
}
//1. Obtain the number of CUB-43PCI-LP devices embedded in PC.
// (Can be omitted if it’s obvious that only one PCI board is embedded.)
Const int Count = CubCountDevice();
If( Count < 1){
   Printf(“CUB-43PCI-LP does not exist. ＼ n”);
   exit(1);
}
//2. Obtain the handle of CUB-43PCI-LP devices.
// (Set the parameter 0 to open if it’s obvious that only one PCI board is embedded.)
HANDLE CubHandle[Count];
for( int I = 0;I < Count; i++){
    CubHandle[i] = CubOpenHandle(i);
    if( CubHandle[i] == INVALID_HANDLE_VALUE ) exit(1);
}
//
// Access to CUB-43PCI-LP is valid at this position.
//
//3. Close the handle which terminated the control.
for( int I = 0;I < Count;i++){
CubCloseHandle(i);
}
```

2.5 Limitations

API in this library cannnot be used at the same time from multiple threads.
Consider not to generate a collective call if the application has multithreaded structure.

2.6 API specification

The following API function specifications in “DLL” folder in the disc is given in this section.

Table2-1 API function

Function	Description
CubGetVersion	Obtain the version information of library
CubCountDevice	Obtain the number of CUB-43PCI-LP devices
CubGetLastError	Obtain the termination status of CUB API function
CubOpenHandle	Open handles to CUB-43PCI-LP board
CubCloseHandle	Close handles to CUB-43PCI-LP board
CubReadByte,CubReadWord	Read access to CUB-43PCI-LP board
CubWriteByte,CubWriteWord	Write access to CUB-43PCI-LP board

2.6.1 CubGetVersion

Format

UINT CUBAPI CubGetVersion(void);

Description

This API checks the version of library.

Parameter

None

Return value

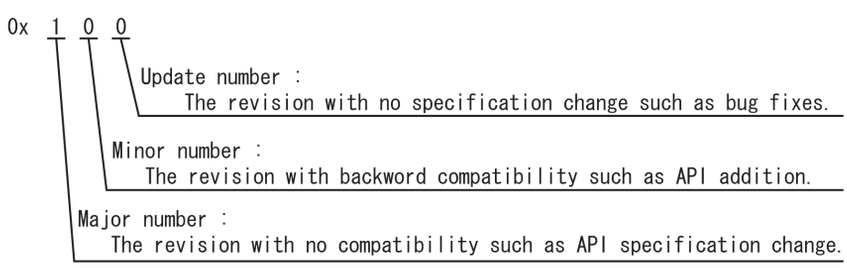
Unsigned integer value, indicates the version of library

Remark

For more secure utility, Step Technica recommends to check the compatibility with DLL via user’s application using cub43pcilp.dll.. The word “secure” means that to avoid forced termination of the program by avoiding function call which is not compatible.

CubGetVersion()API obtains the version of DLL. The hexadecimal value of version number which this API returns has meanings given in the following.

The hexadecimal number lower than second digit can be ignored because of backward compatibility, however, Step Technica recommends not to call API of cub43pcilp.dll if the value upper than third digit has been changed. Compatibility needs to be checked prior to the initialization.


0x 1 0 0
Update number :
The revision with no specification change such as bug fixes.
Minor number :
The revision with backword compatibility such as API addition.
Major number :
The revision with no compatibility such as API specification change.

2.6.2 CubCountDevice

Format

UINT CUBAPI CubCountDevice(void);

Description

This API checks the number of existing CUB-43PCI-LP device.

It's not necessary to call the function if the number of CUB-43PCI-LP board is obvious. CubOpenHandle() must fail if this function does not obtain the return value which is 1 or upper.

Parameter

None

Return value

-1	Over 10 boards exist
0	No boards exist
1 ～ 9	1 to 9 boards exist

2.6.3 CubGetLastError

Format

UINT CUBAPI CubGetLastError(void)

Description

This API checks the termination status of API function which the process called last time.

Parameter

None

Return value

The definition in cub43pcilp.h is the following.

Non-numeric literal	Value
CUB_SUCCESS	0/* Terminated normally. */
CUB_ERR_DEVICENOTEXIST	1/* Device does not exist. */
CUB_ERR_ALREADYOPENED	2/* Handle is already opened. */
CUB_ERR_CLOSED	3/* CubOpenHandle() has never been called*/
CUB_ERR_INVALIDPARAM	4/* Called with invalid parameter. */
CUB_ERR_NORESOUCE	5/* No resource to execute the process. */
CUB_ERR_FAILED	6/* The process failed due to unknown reason. */
CUB_NOTCALLYET	99 /*API has never been called yet. * /

2.6.4 CubOpenHandle

Format

HANDLE CUBAPI CubOpenHandle(int Instance);

Description

This API returns the handle to CUB-43PCI-LP board of which has the specified instance. It is possible to obtain multiple handles from the same instance. There is no failure due to CUB_ERR_ALREADYOPENED in current version. All API described from this section need to be called using the handle that obtained with CubOpenHandle(). Also, close the handle by calling CubCloseHandle() after all processes are terminated.

Parameter

Serial number of the board whose base point is Instance "0."
The board number to obtain each handles of embedded boards. If only one board is embedded, the handle should be opened with the parameter "0."

Return value

Succeeded : HANDLE is returned.
Failed : INVALID_HANDLE_VALUE is returned. Check for the details of failure with CubGetLastError().
Non-numeric literal, INVALID_HANDLE_VALUE is available having windows.h included.

2.6.5 CubCloseHandle

Format

BOOL CUBAPI CubCloseHandle(HANDLE CUBHandle);

Description

This API closes the handle which is obtained with CubOpenHandle().

Parameter

CUBHandle Handle to be closed

Return value

Succeeded: TRUE is returned.
Failed: FALSE is returned.

2.6.6 CubReadByte , CubReadWord

Format

BOOL CUBAPI CubReadByte(HANDLE CUBHandle, ULONG Adr, BYTE* Dat);
BOOL CUBAPI CubReadWord(HANDLE CUBHandle, ULONG Adr, WORD* Dat);

Description

This API obtains BYTE / WORD data from the specified address of CUB-43PCI-LP.

Parameter

CUBHandle	The handle to targeted CUB-43PCI-LP.
Adr	An offset address of the starting address.It must be a multiple of 2 via WORD access.
Dat	A pointer to BYTE / WORD area where the obtained value is stored.

Return value

Succeeded: TRUE is returned.
Failed: FALSE is returned.

2.6.7 CubWriteByte , CubWriteWord

Format

BOOL CUBAPI CubWriteByte(HANDLE CUBHandle, ULONG Adr, BYTE Dat);
BOOL CUBAPI CubWriteWord(HANDLE CUBHandle, ULONG Adr, WORD Dat);

Description

This API writes BYTE / WORD data to the specified address of CUB-43PCI-LP.

Parameter

CUBHandle	The handle to the targeted CUB-43PCI-LP.
Adr	An offset address of the starting address.It must be a multiple of 2 via WORD access.
Dat	BYTE / WORD data where the obtained value is stored.

Return value

Succeeded: TRUE is returned.
Failed: FALSE is returned.

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